Michigan State University CCU (Control and Concentrator Unit)
Information for Safety Review for LAPD.

The MSU Control and Concentrator Unit (CCU) is a 48-channel device to control scintillation counters using the Hamamatsu H5783 photomultiplier module coupled with the MSU Photomultiplier-tube Amplifier and Discriminator (PAD). This system was used previously to control 144 TSU counters and approximately 500 other counters in the CDF-Run-II detector. A publication "Gain and Threshold Control of Scintillation Counters in the CDF Muon Upgrade for Run II, C. Bromberg in Proceedings of the APS DPF conference DPF2000, Columbus, Ohio, Aug. 2000, gives a general description of the MSU trigger counter system that has been installed in PC4 around the LAPD cryostat. There are 48 TSU counters being controlled by one CCU.

For details of the electronics, the schematics for both the CCU and PAD circuits are attached to this document. Each CCU module has 4 internal commercial power supplies, which are fused at their inputs (-11V, +15V, +5V, -7V) and have on board over-current protection on the outputs.

During deployment at CDF it was shown that the distributed DC powered counters are fused or have some other current limiting feature to prevent any short circuit on the counters from causing a fire. On a Cat5 cable (AWG bare copper conductors rated at 0.3A) to each TSU counter, the CCU distributes digital control and counter signals as well as ground and two DC voltages, +12V and –5V. Schematic pages 14-16 show the +12V supplied by a regulator (LM78L12ACM), while the -5V (–VIN) supplied by a regulator (LM79L05ACM). The data sheet for the regulators list as features:

* Output current of 100 mA
* Internal thermal overload protection
* Output transistor safe area protection
* Internal short circuit current limit

Both regulators, with a maximum output current of 0.1A and thermal overload protection, as well as the Cat5e cable don't pose fire hazards in the CCU or at the PAD circuits in each counter. The sealed H5783 photomultiplier module generates internally its photomultiplier HV from the +12V supply and therefore the high voltage poses no safety hazard. Also, as shown in the published document, the counters are completely encased in a 20-mil thick aluminum shell, which prevents direct ignition by an external flame.

For any further safety issues, please contact C. Bromberg, Prof. of Physics, Michigan State University, East Lansing, MI 48824, Email (bromberg@pa.msu.edu), or telephone (616 481 3533)